SUMMARY OF SWIFT FOX RESEARCH NEAR MEDICINE BOW, WYOMING - SUMMER 1999

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INTRODUCTION

During the summers of 1997 and 1998 we conducted trials designed to estimate the probability of detecting swift fox presence using tracking plate transects when swift foxes were known to be present (Olson et al. 1997, Olson et al. 1998). In late August 1999, trials were repeated using the same sample transects. Our objective was to obtain an estimate of the probability of detecting 1 swift fox of a pair using tracking plate transects placed within a pair's home range. During the summer of 1999 we also monitored home range and habitat use of radio-collared foxes on the study area. Comparison of home range locations with ranges from the previous 2 summers allowed us to investigate the assumption that swift fox home ranges will be filled year to year if the population is not declining. This is the primary underlying assumption associated with using permanently placed tracking plate transects for monitoring swift fox presence over time.

STUDY AREA

This study was conducted on the southern edge of the Shirley Basin in northwestern Albany County, near Medicine Bow, Wyoming. The study area covered approximately 220 km^2, at an average elevation of 2075 m (6800 ft). Plant communities consisted of sagebrush steppe and mixed grass prairie. Habitat was primarily grass dominated, interspersed with patches of low-growing (<1 m) sagebrush (*Artemisia*) and taller greasewood (*Sarcobatus vermiculatus*). Topography of the area was mostly flat with numerous dry lakebeds and several saline lakes. The climate of the area was characterized by long, cold, snowy winters and warm, dry summers. Precipitation averaged 26 cm (10.3 in), including 59 cm (23 in) of snow annually (Pers. Comm. Medicine Bow town office). Other predators present were badgers (*Taxidea taxus*), coyotes (*Canis latrans*), golden eagles (*Aguila chrysaetos*), and ferruginous hawks (*Buteo regalis*). No red foxes (*Vulpes vulpes*) were seen on the study area during the course of study. White-tailed prairie dog (*Cynomys leucurus*) colonies of variable size were found on the study area. Land ownership was mostly private and the primary land use was cattle grazing. Human developments consisted of fences, windmills, stock ponds, and secondary roads.

METHODS

Swift foxes were captured on the study area between January and May for 4 consecutive years (1996 - 1999). We captured swift foxes using Tru-catch live traps baited with butcher

scraps (Dieni et al. 1997). Previously collared foxes were targeted for recapture, and old collars were replaced. After old foxes were recaptured, the remainder of the study area was trapped for new foxes. Traps were checked twice nightly to minimize the time a female might be kept from her pups. Each captured fox was ear-tagged and fitted with a radio collar (Advanced Telemetry Systems Inc., Isanti, MN), weighed, and released. Foxes captured in 1998 and 1999 were marked with colored ear-tags, and a unique combination of colored tape on the radio-collar to allow visual recognition of individuals.

Home range use of collared foxes was monitored during the late spring/summer from 1997-1999 using radio telemetry. During late spring/summer of 1997 we triangulated swift fox positions at night using a combination of a roof mounted omni antenna and a hand held "H" antenna. We used at least 3 intersecting azimuths per location. The observer's position was determined from USGS 1:24000 scale topographic maps. We estimated home ranges for each pair of foxes in 1997 from telemetry locations, and from the average activity radii of male swift foxes (plus 1 SD, Pechacek et al. unpublished manuscript). During late spring/summer of 1998 and 1999 we located swift foxes at night using 2 truck-mounted telemetry towers equipped with 2, 3-element yagi antennas joined with a null / peak box. Each truck was located at a known position and simultaneous bearings were taken from each truck toward a radio-collared fox. We then used the computer program Locate II (version 1.3) to triangulate fox locations. We estimated fox home ranges (adaptive kernel method, 95 % utilization distribution) for the summer of 1998 and 1999 using the program Ranges V.

Two test trials were run for 7 days each during the summer of 1997 to estimate the probability of detecting 1 fox from a marked pair, using tracking plates (Olson et al. 1997). Transects, 1 km (0.6 mi.) in length and consisting of 4 stations separated by 0.3 km (0.2mi), were placed within or near the core use area of each pair (50 % utilization distribution) and in the area where overlap with adjacent foxes was absent or minimal. We purposely avoided areas of overlap with adjacent fox pairs to minimize the number of adult foxes which would likely encounter each transect. Transects were placed in selected locations (e.g., along fence lines, road intersections) to increase the likelihood of fox visitation. Each station consisted of a 61cm x 61cm (2 ft x 2 ft) tracking plate (sheet steel) and an infra-red, remotely triggered camera (TrailMaster TM 1500, Goodson and Assoc. Inc. Lenexa, KS). Tracking plates were sprayed with a talcum powder-ethanol mixture, leaving a thin coat of talc on the plate, and baited with approximately 5 g of canned mackerel in the center of the plate (Woolley et al. 1995). We started each trial on a day forecasted to be dry because rain would have destroyed the tracking medium (talc). Mackerel was used as an incentive for the foxes to re-visit the plates. Cameras were triggered when an infra-red beam of light centered across the plates was broken, allowing us to identify foxes (marked or unmarked) that visited plates from photographs. If a photograph showed a marked fox, we assumed (in 1997) the fox was one of the pair in whose core area the transect was located. Tracking plates were checked each morning, and swift fox tracks were measured and recorded. Plates were re-baited later that day (early evening). Number of photographs taken each night was recorded, and film was replaced as needed.

The transect / fox pair was the sample unit, and the proportion of transects detecting presence of marked swift foxes during each trial was considered the detection estimate. We constructed approximate 95% confidence intervals for detection probability estimates as described by Johnson and Kotz (1969). We ran the same 9 transects in 1998 as we had in 1997 but added 1 additional transect in an area where we did not have a radio-collared fox pair in 1997. All 10 transects were run in 1999. By running the same transects each year we hoped to test the assumption that home ranges will be filled from year to year if the population is not declining. Running the same transects also simulated how we suggested a monitoring program be operated from year to year in state-wide application. Of the initial transects run in 1997, we determined which transects were still located within a swift fox pair's home range each year and used data from those transects to estimate detection probabilities in 1998 and 1999.

RESULTS

We captured 28 swift foxes on the Medicine Bow study site between 14 Jan and 15 May 1999. Of these, 13 were previously collared and 15 were new foxes. By the end of August 1999, 9 of the collared foxes had died, 5 were missing, and 14 were still alive on the study area. Mortality was primarily due to coyote predation (7 of 9), but one fox was apparently killed by a raptor, and one died from canine distemper virus.

See Olson et al. (1997, 1998) for detailed results from the summers of 1997 and 1998. Of the 10 transects run in late August 1999, only 8 were still located within swift fox home ranges. We detected swift fox tracks on 5 of those 8 transects (0.63) after 7 days (Table 1). We also obtained photographs of foxes on 2 transects where we did not detect tracks. On one transect where we obtained a photograph but did not detect a track, the photograph showed a fox on the plate, but due to damage of the tracking medium by rain we could not distinguish the track. Based on detection results from both cameras and tracking plates, we detected swift foxes on 7 of the 8 transects (0.88) where foxes were known to be present (Table 1).

Table 1. Swift fox detection probability estimates using tracking plate transects near Medicine Bow, Wyoming 1997-1999.

Detection Type	Probability (95% CI)			# Days		
Year	97	98	99	97	98	99
Tracks on Plates	0.88 (0.47-1.0)	0.88 (0.47-1.0)	0.63 (0.24-0.91)	6	6	7
Tracks and photographs	1.0 (0.63-1.0)	0.88 (0.47-1.0)	0.88 (0.47-1.0)	6	6	7

Of the 9 transects that were within home ranges in 1997, 7 were still in home ranges in 1998 (Table 2). Of the 8 transects that were within home ranges in 1998, 6 were still in home ranges in 1999, and of the 9 transects that were within home ranges in 1997, 7 were still in home

ranges in 1999. Table 2 displays which transects were located within home ranges each year, and detection results for each transect. If the detection method is able to detect foxes with a high probability when present, we expected to detect swift fox presence if the transect was located within a pair's home range. This pattern generally held with the exception of transect number 1 Table 2).

The number of collared swift foxes on the study area during the late August trials was similar during the 3 years of this study (Table 3). However, there were fewer new foxes in 1999 than in 1998 (27 % vs. 70 %).

Table 2. Summary of swift fox detection results using tracking plates transects and cameras from trials conducted in late August 1997-1999 near Medicine Bow, Wyoming.

	In home range			Track Detection			Photograph Detection		
Transect #	97	98	99	97	98	99	97	98	99
1	Y	Y	Y	N	N	N	Y	N	Y
2	Y	Y	N	Y	Y	N	Y	Y	N
3	Y	Y	N	Y	Y	N	Y	Y	N
4	Y	Y	Y	Y	Y	N	Y	Y	Y
5	Y	Y	Y	Y	Y	Y	Y	Y	N
6	Y	N	Y	Y	N	N	Y	Y	N
7	Y	Y	Y	Y	Y	Y	Y	Y	Y
8	Y	N	Y	Y	N	Y	Y	N	Y
9	Y	Y	Y	Y	Y	Y	Y	Y	Y
10	NA	Y	Y	NA	Y	Y	NA	Y	Y

Table 3. Number of collared foxes present on Medicine Bow, Wyoming study area during late August 1997-1999.

Year	1997	1998	1999
# Collared Foxes	13	17	15
# Foxes From Previous Year		5	11
% New Foxes		70%	27%

DISCUSSION

Estimated swift fox detection probability using tracking plate transects was slightly lower in 1999 than the previous 2 years. However, the estimate for 1999 (0.63), falls within the 95 % confidence interval (0.47-1.0) for the detection rate from the previous 2 years. One possible explanation for lower detection in 1999 is that there was a lower turnover in the population between 98 and 99 than between 97 and 98. This resulted in more older foxes that were exposed to tracking plate/camera stations the previous year. Older foxes may be more wary

and therefore less likely to step on tracking plates.

Generally, swift fox pair home ranges were filled from one year to the next on our study area. Each year, 2 ranges from the previous year were not filled, however the 2 ranges that were vacant in 1998 were filled again in 1999. This seems to strengthen the assumption that swift fox home ranges will be filled from one year to the next if the population is not declining. That we observed a high turnover rate in the population (especially from 1997 to 1998), yet maintained foxes within home ranges, indicates that areas selected as home ranges by previous foxes are also chosen by new foxes. This further strengthens the assumption that ranges will be filled if the population is not declining.

LITERATURE CITED

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SWIFT FOX COMPLETION REPORT

Bob Luce, Lee Hunt, and John Priday, Wyoming Game and Fish Department.

STATE OF WYOMING NONGAME MAMMALS – Species of Special Concern

PERIOD COVERED: 16 April 1999 – 15 April 2000

INTRODUCTION

The swift fox monitoring project will occur in two phases.

The purpose of the distribution survey conducted in 1999, and of surveys planned for 2000, was to document known locations of swift fox (*Vulpes velox*) in the current range in Wyoming. Baited track plates placed in a continuous transect up to several miles long with a track plate spacing of 1.6 km (1 mi) between plates was found to be the most effective method for documenting swift fox in areas with potential habitat but unknown population status (Dieni et al. 1997).

Surveys to develop baseline transects for monitoring long-term population trends will begin in 2001. These trend surveys will occur in locations documented to have swift fox during the 1999 and 2000 distribution surveys. The University of Wyoming Cooperative Fish and Wildlife Research Unit developed the survey method, which will be used during this project (Olson et al. 1999). The trend transects will use a more intensive survey method (five track plates at a spacing of .8 km (.5mi) between plates). Approximately 20 transects will be surveyed in each of three geographic region with each transect no closer than five miles to another. The method is based on the assumption that there is an 88% probability that a fox documented in a location will remain in or return to the same location the following year (Olson et al. 1999).

Repetition of the 2001 surveys in 2006 will document the long-term trend for the species.

According to Woolley et al. 1995, the current population occurs primarily in three geographic regions: 1) Laramie Valley and Shirley Basin in Albany and Carbon counties, 2) Southeastern Plains–parts of Laramie, Platte and Goshen counties, and 3) Powder River Basin-parts of Converse, Natrona, Weston and Niobrara counties. Surveys were conducted in the Laramie Valley and Shirley Basin areas in 1999. The second and third regions will be surveyed in 2000.

METHODS